FUTURE CIRCULAR COLLIDER

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IR alignment and Xsuite migration

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The performance of the Future Circular Collider - electron-positron (FCC-ee) relies critically on the precise alignment of its Interaction Region (IR) components. Small misalignments can significantly degrade the dynamic aperture and luminosity, demanding stringent control of mechanical tolerances. This study uses detailed tuning simulations developed in pyAT, to determine the acceptable misalignment ranges for key IR elements. To enhance simulation capability and flexibility, the tolerance studies are being migrated to the Xsuite framework. This migration will allow to perform modeling of machine imperfections and correction procedures in the same framework as beam-beam and collective effects, which is a critical step for the FCC-ee. The present work contributes to the ongoing development for deploying Xsuite as a next-generation tool in accelerator physics research and operations at CERN.

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